

THE ZOOLOGIST

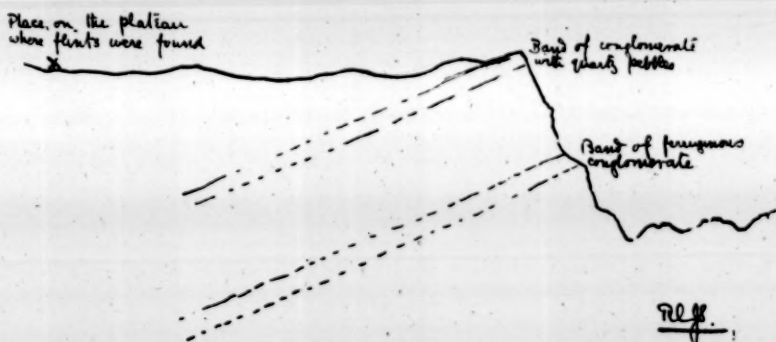
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PREHISTORIC MAN IN BURMA.

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PLATE I.

IN the year 1894, Dr. Fritz Noetling, F.G.S., Palæontologist, Geological Survey of India, published in the 'Records' of that Department an article on certain flints, believed to be artificially chipped, which were stated to have been found in a stratum of ferruginous conglomerate which encircles the dome or anticline at



the oil-fields of Yenangyoung, in Upper Burma.* Dr. Noetling was, when the discovery was made, studying the geology of the

* "On the Occurrence of Chipped (?) Flints in the Upper Miocene of Burma," by Dr. Fritz Noetling, F.G.S. ('Records of the Geological Survey of India,' vol. xxvii. 1894, part 3.)

oil-fields with a view to reporting on their economic value, and was incidentally attracted by the Tertiary remains that occur at this locality. The ferruginous conglomerate, which proved to be very useful in determining the geological features of the oil-fields, was stated to contain numerous remains of *Hippotherium antelopinum* and *Aceratherium perimense*, and was therefore held to be either of Pliocene or Upper Miocene age. The learned Doctor found these chipped flints on a shelf of ferruginous conglomerate on the eastern slope of a ravine high above its bottom, but below the edge, in such a way that he could not conceive how they could have been brought there by any foreign agency, and he says that, to the best of his knowledge, he really found them *in situ*.

While Dr. Noetling was still occupied at Yenangyoung, Mr. Oldham paid a visit to that place, and they made a search together for more flints in the place where the first had been found, but without success; and in his paper on "The Alleged Miocene Man in Burma" ('Natural Science,' vii. 1895, p. 201), Mr. Oldham stated that the flints are not confined to the outcrop of the ferruginous conglomerate, but are scattered over the surface of the plateau above. He further considers the flints to be natural products.

In answer to this, Dr. Noetling published, in 'Natural Science,' x. 1897, p. 233, a further article "On the Discovery of Chipped Flint Flakes in the Pliocene of Burma," objecting that, when the implements occur on the plateau, as near Minlin-toung, at the southern extremity of the dome, they were strictly confined to the outcrop of the ferruginous conglomerate; and in this article he introduced the facettèd femur of *Hippopotamus irravadicus*, which he found in a small streak of the conglomerate not far from the flints, and which, as he believes can only have been facettèd by human agency. This he puts forward in support of the Pliocene or Miocene flint implements as further proof of the existence of the human species in Burma in Tertiary times.

Since the publication of these discoveries many writers have referred to them, and in most instances have accepted them as proof of the vast antiquity of man in Burma, and no doubt, besides the few references given here, many more could be found by anyone with access to a good library. In Mandalay, however,



books on such subjects are not numerous ; but it is, in fact, surprising that nearly every book in which the antiquity of man is discussed at all, and that has come under the writer's notice, makes a special allusion to these Yenangyoung flints, and the lessons that they teach.

In 'The Wonderful Century,' edition 1901, Mr. A. R. Wallace says, on p. 131, referring to the great antiquity of man :—" But evidence has been steadily accumulating of his existence at the time of the glacial epoch, and even before it ; while two discoveries of recent date seem to carry back his age far into pre-glacial times. These are, first, the human cranium, bones, and works of art which have been found more than a hundred feet deep in the gold-bearing gravels of California. . . . The other case is that of rude stone implements discovered, by a geologist of the Indian Survey in Burma, in deposits which are admitted to be of at least Pliocene age." In the sixth edition (1900) of 'Prehistoric Times,' p. 402, Lord Avebury, after referring to the Java skull, says :—" Dr. Noetling, of the Geological Survey of India, has also recorded unquestionable flint flakes found in Burma with remains of *Rhinoceros perimensis* and *Hippotherium* (*Hipparion*) *antelopinum* in strata considered to belong to the Pliocene period." In 'The Races of Man,' by J. Deniker (1900), reference is also made to these flints and the polished bone ; and in his popular little book on the 'Story of Primitive Man,' Mr. Edward Clodd also mentions them. No doubt, also, many learned societies, both in England and Germany, have published papers on the subject.

There has thus sprung up round these flints a more or less considerable literature, and, taking them together with the polished bone, the tendency has been to accept them as evidences of the existence of man at a time when the ferruginous conglomerate at Yenangyoung was being deposited, and when the beasts whose remains (chiefly teeth) are found in that deposit were walking the earth. Already we seem to be on a bowing acquaintance with our rude ancestors of pre-glacial times. They chipped flints into flakes, breaking down the angle at the base, no doubt to fix into a handle ; while some flakes, that were not so well fitted for arrow-heads, they doubtless used in the hand as scrapers. After a good meal off a thigh of *Hippopotamus*

irravadicus (whether cooked or not cannot be told) they amused themselves rubbing down the substance of the bone, and making a rude ornamentation by facetting it in this way. Knowing this much about life in these extremely remote times, one naturally wants to know more, especially seeing the great importance of such discoveries in the study of that science which seeks to view Man in his true perspective in the evolution of life on the earth.

As an amateur enquirer into these matters, and finding myself within comparatively easy reach of Yenangyoung, it seemed to me a pity not to make further search, and try to discover further evidences which would place the matter beyond doubt; and this paper is a brief record of two visits made by Lieut.-Col. Nichols, R.A.M.C., and myself, in December, 1900, and December, 1901, with this object. I am bound to confess, however, that our results not only do not corroborate Dr. Noetling in his discovery of Tertiary Man, but cannot, I think, fail to cast a doubt on the age of the flint flakes and chips picked up by him. And, lest it should be considered to be mere rashness in an amateur to venture to discuss technical subjects with a professor of palæontology, I may say that I shall endeavour to record only facts, leaving discussions to others; and that, after all, an amateur can pick up stones almost as well as a professor, while a small amount of geological knowledge will suffice to determine whether, at any particular part of the plateau at Yenangyoung, so conspicuous a band as the ferruginous conglomerate comes out on the surface, or is buried one hundred feet or so below it.

If I cannot resist at times venturing to draw conclusions from facts, such conclusions are no doubt of no value whatever, and may be disregarded.

Our first visit to Yenangyoung, in the Christmas holidays of 1900, may be called a failure, so far as the flints are concerned. We were not aware beforehand of the extremely confusing nature of the ground, intersected as it is in all directions by a network of ravines, and we were disappointed at not finding at Yenangyoung a copy of Dr. Noetling's Geological Map, in which he had marked the spot where he found the flints with No. 49. The Township Officer kindly searched in his office, but the map was not forthcoming, and all idea of locating the flints had to be abandoned,

and instead we occupied ourselves in collecting Tertiary mammalian remains from the neighbourhood. Among these, however, we obtained an upper premolar of a small species of *Rhinoceros*, which will be mentioned hereafter in connection with the worn femur of *Hippopotamus* found by Dr. Noetling. At Christmas, 1901, Col. Nichols and I made a second visit to Yenangyoung for the purpose of searching for the flints, but since our first visit we had, through the kindness of Mr. T. D. LaTouche, of the Geological Survey of India, and in the absence on leave of Dr. Noetling in Europe, obtained a tracing of a portion of the latter's original map of the Yenangyoung oil-field, showing No. 49.* We had also, during the year 1901, made a collection of Tertiary mammalian remains from a long strip of sandstone almost opposite Mandalay, the locality having been accidentally discovered by means of a stray bone which I picked up on the river-bank at Mandalay Shore, and which we were able to trace as having been brought across the river, together with some large stones used for strengthening the Bund. The sandstone in which these remains were found appears to be a derived bed, and to contain remains of animals ranging from Pliocene, or earlier, to Post-Tertiary times. Out of several hundred specimens, some merely fragmentary, and others distinct and well preserved, which we have carefully examined, not one bears any trace of having been manipulated by man, and though this is only negative evidence, which may be upset any day by the discovery of a specimen exhibiting cuts or deliberate scratchings, it is entitled to some weight, especially having regard to the fact that the flint chips at Yenangyoung, as will be seen hereafter, are to be found in considerable numbers. If these are but the survivors of the changes and chances of this world since Pliocene times in this one locality, they would indicate a large population in Burma at this period overrunning the country, and living on the flesh of wild animals.

We spent four days at Yenangyoung, and so difficult and confusing is the country, that even with our previous knowledge

* The map published in the 'Memoirs' of the Geological Survey of India, vol. xxvii. part 2, on "The Occurrence of Petroleum in Burma, and its Technical Exploitation (Noetling)," is reduced from the original, and No. 42 is not marked on it.

of the locality, and the help of map and compass, we had great difficulty in placing ourselves on the spot indicated on the map as No. 49. The whole country is so closely furrowed with ravines, into and out of which it is necessary to scramble constantly in order to make any progress, that it is almost impossible at times to maintain a fixed direction, and very difficult to identify quickly any of the minor features in the map with the locality.

The great feature, however, which there is no mistaking, and which was of chief importance to us, is the dull red band of ferruginous conglomerate that surrounds the oil-field, and in which Dr. Noetling found his flint chips. This bed is called by Dr. Noetling the zone of *Hippotherium antelopinum*, and is thus described by him on p. 87 of the 'Memoirs,' vol. xxvii. part 2:—"This zone forms a well-marked horizon in the sequence of the strata, and crops out in the shape of an elongated ellipse, the long axis of which measures two and quarter miles, while the short (transverse) axis amounts to slightly over a mile only."

In fact, the beds here, including this zone, have been raised from their original horizontal position by pressure on all sides into a long turtle-back dome, and then the crown of the dome has been shaved off, leaving their edges exposed all around the area of it.

The theory of Dr. Noetling is that the chipped flints belong to the zone of *Hippotherium antelopinum*, and to *nowhere else*, and that in this zone they are "not rare."* The remains found in this zone indicating a Pliocene, and perhaps even a Miocene age, it follows, if the above theory is correct, either that a considerable Pliocene population existed who made the chips, or else that these are natural pieces, and not the work of man. This alternative has probably induced many to reject the former as improbable, and, against their better judgment, to hold that the chips are natural.

But what becomes of the theory if they can be picked up, as Mr. Oldham says, on the plateau anywhere, quite apart from the zone of *Hippotherium antelopinum*? And what if, when picked up by scores, as they can be, some two hundred feet above the said zone, they can in some instances be fitted together again,

* 'Records,' vol. xxvii. 1894, part 3, p. 20.

and, in the majority of cases, can be with fair certainty grouped into families belonging each to a separate original store, thus proving that they are chips belonging to flints which were broken up at the spot where they are now found undisturbed? If the chips have no connection with the Pliocene stratum, the difficulty occasioned by their numbers and fitting together is got over, and there is no necessity to do violence to one's feelings by supposing that in some way or other the original flints must have got chipped up spontaneously.

On the first day we went from Thittabwe to Minlin Hill, round the northern and eastern sides of which the ferruginous conglomerate crops out, and began by examining the bed there, as it is clear that, if chipped flints are a feature of this bed, they may be found scattered throughout it, and not only at one definite spot. Finding nothing, we searched Taung-ni-gale (the small red hill), to the east of Minlin, where the conglomerate outcrops on the surface, and where Dr. Noetling had previously found some poor specimens; but we were again unsuccessful. We then proceeded in a northerly direction, towards No. 49, crossed the Ye-dwin-aing Yo (a "Yo" is described in Stevenson's Dictionary as a blind watercourse), and kept on till we calculated we were somewhere near No. 49. As it subsequently turned out, we were still a little to the south of it, when we stopped and examined the conglomerate (which here runs in a general north and south direction some fifty feet below the edge of a ravine), and picked up a few rolled fragments of bone, and (in a small yo) a few specimens of *Batissa crawfurdi*, which had apparently rolled down the steep bank. As the day's work, we had examined the conglomerate carefully from Minlin Hill almost up to No. 49.

On the second day we crossed the oil-field from west to east by the cart-track that leads by the gas-well, and continued on till we came to where the conglomerate crosses the road at right angles on the east side, and spent the day searching the conglomerate both north and south of this place, but chiefly to the north, where it looked more promising. It continues to run here some way below the edge of a ravine, and can be searched without much difficulty. All this part was obviously in the vicinity of No. 49, and, so long as we stuck to the conglomerate, it did not seem to matter whether we were on the identical

spot or not. Beyond some rolled fragments of bone we found nothing.

On the third day (Christmas Day) we started on the same route, but stopped short at the conglomerate on the western side, and examined it for a considerable distance in both a northerly and southerly direction, especially where it outcrops by the side of the road leading north into Bene village. Again we found no signs of flints. Some rolled fragments of bone were all that had up to now rewarded our efforts, though we had examined a considerable portion of the bed in different localities. We found the nature of the conglomerate to differ in different places, as noted by Dr. Noetling at p. 59 of the 'Memoirs,' vol. xxvii. part 2, where he says:—"At some places it is a rather incoherent agglomerate of irregularly shaped concretions of a ferruginous clay, at others it contains numerous quartz pebbles cemented by a hard conglomerate sandstone, at others again it is an earthy iron ore of a bright red colour." But, whatever the nature of the conglomerate, it was apparent that had any foreign substance, such as flint chips, been exposed on its surface, or lying out on the numerous slopes where the detritus of the bed was spread out, as if on purpose, we must have found them, at any rate, as easily as we found the numerous fragments of bone.

On the fourth and last day of our visit we determined to make an effort to locate No. 49 precisely, in case there might be some quite local feature which did not exist elsewhere, and we therefore crossed the oil-field, as on the second day, and, on coming to the eastern side, sent the cart up on to the plateau beyond, with instructions to turn southwards, following the course of the ravine, and stop at about the place where we calculated that it would be opposite No. 49; while we also went southwards, but kept down in the ravine, searching the conglomerate, and the slopes below it. By breakfast-time we had joined up our first and second days' searches, and had found nothing beyond the usual rolled fragments and a few pieces of a tooth, apparently *Aceratherium perimense*. Above the conglomerate, however, we found a bed composed of innumerable shells of *Batissa crawfurdi*, such as is mentioned by Dr. Noetling as occurring near where he found the flints. We both agreed, judging from our present position and distance from Minlin Hill,

as well as from our first day's work, when we had approached from the opposite direction, that we were as near No. 49 as we could ever hope to be, and that the locality answered with sufficient accuracy to the description and drawing given by Dr. Noetling. It was, of course, impossible to be wrong except in a north and south direction, as the ferruginous conglomerate is unmistakable, and occurs only once on the eastern side, and, as we had estimated the distance with the map both from Minlin Hill and from the cart-road to the north, we could feel fairly certain of the exact spot. We breakfasted on the plateau, about one hundred and fifty yards back from the edge, and afterwards, while I was endeavouring to fit together the fragments of tooth I had found, Col. Nichols walked a little farther to the east over the plateau to survey the direction of the "yos," and returned with a handful of flint chips which he had picked up on the plateau not thirty yards off. They were very irregular pieces, and not at all promising, but they were at any rate flint chips, and we instituted a search on the spot, assisted by our Burman servant and the cart-man. Within a radius of about fifty yards we found a considerable number of pieces of different sizes and shapes, from large rough lumps almost as big as the fist down to little shavings; and, as they were easily seen lying on the brown earth among the short dry grass, we managed to collect, within half an hour or so, a cartridge-wallet full. Unfortunately, it seemed to us at the time so unlikely that these pieces should really be identical with those considered by Dr. Noetling to be Tertiary flints, that we did not notice many details as to how they were lying which might have been useful. We noticed, however, that the pieces were most numerous in the centre of the area, and quickly grew less common at the outside, and after a little ceased altogether. The larger pieces were all, I believe, found somewhere near the centre of the area. The impression we got at the time was that some lumps of flint had been either found or brought there, and had been broken up on the spot for some purpose, and that what we had found were the remains of that operation. We did not examine them very carefully at once, but detected one or two cores, and one or two pieces that might have been rough implements.

Having collected all we could without a very prolonged search

in that one area, we proceeded towards the edge of the ravine, some one hundred and fifty yards off to the west. For some distance after the flints had ceased there were no stones or other objects to be found on the ground, but when getting towards the edge we found a few quartz pebbles, which became more numerous, and which we discovered came out of a band of very dark conglomerate which outcrops and forms the edge of the ravine just there, having withstood the action of the weather better than the soft sandstone. This conglomerate was about fifty feet above the ferruginous band, and appeared to be quite local. All the strata there dip to the east at a very considerable angle, and the dark conglomerate would therefore be a long way below the surface at the place where the flints were found, one hundred and fifty yards away; while, at the same place, we calculated that the bed of ferruginous conglomerate would be at least two hundred feet below the surface.

There is thus no possible connection between the conglomerates (least of all the ferruginous conglomerate) and the flints which we found; and, though it might be suggested that they came out of some higher band which had worn down, leaving them on the surface, the circumstances under which they were lying grouped together—evidently the chips from stones broken up on the spot—point to a different conclusion.

There can be no doubt of the identity of these chips with those described and figured by Dr. Noetling. Mr. LaTouche, who has examined both, tells me that they are exactly alike in appearance, and he cannot detect any difference. They have the same porcelain glaze, are in the same condition, and they were found (though not in the ferruginous conglomerate) in the immediate vicinity of the spot where Dr. Noetling found his. Two or three of our specimens are, Mr. LaTouche says, better than any of those found by Dr. Noetling, and more clearly intended for some purpose such as arrow-heads.

An examination of them shows that they may be roughly divided into irregular lumps and thin flakes. The stone itself is chert, or impure flint, and I do not know for certain from where it was brought. There were no other stones at the place where the pieces were found. There is one obvious core, and there are at least three specimens which seem to be more or less finished

arrow-heads. One specimen in particular has been skilfully chipped into a very symmetrical arrow-head without any unnecessary work—and, indeed, with a minimum of labour—showing that considerable skill had been acquired and utilized in producing such an object. The great similarity between this and at least two other specimens would seem to show an evident design, and that the chipping was done with the object of producing instruments shaped like this. No doubt the more perfect or finished specimens were carried off; but those that are left, together with the miscellaneous chips and the lumps of original flint, are sufficient to show what was the purpose in hand. Each specimen has one flat surface, with a bulb of percussion, showing that it was deliberately struck off a larger piece; on its other surface is the angle usual in flint flakes, and this angle has—in two specimens, at least—been broken down at one end as if to fit into a handle. There is a good point, and the whole object would form a very serviceable arrow-head. I cannot help thinking that specimen No. 1 at least is a finished one, and that it represents a fair type of the work of the men who made it, and was accidentally left behind. It does not require any more finishing—secondary chipping at the edge would be superfluous—and the only improvement would be further trimming at the base.

Many people have thought, from Dr. Noetling's specimens, that these are natural chips, but I think that is chiefly because they have felt constrained to believe that they were embedded in a Tertiary stratum, and that when it is shown that there is no connection between the two, and that they may be the work of ordinary Palæolithic man, common sense will show that these stones cannot have chipped themselves up in this manner, still less have fashioned themselves into symmetrical shapes with bulbs of percussion and angles complete.

It is clear that these chips do not come from the ferruginous conglomerate, and I cannot see what difficulty there is in believing that some dropped over the edge of the ravine on to the ledge where Dr. Noetling found his. Certainly none of those from the particular area which we found could have so dropped; but if, as Mr. Oldham says, they occur anywhere on the plateau, there are doubtless many other areas of them, and

Dr. Noetling might easily have picked his up just underneath one of these. The edge of the ravine, though sometimes nearly perpendicular, does not overhang, and, with a ledge of conglomerate such as Dr. Noetling figures, it is certain that stones, dropping over as the edge wears away, might be caught on it. We were unable to look about on the plateau for further groups of chips, as we had to leave Yenangyoung the next day, and thought it only right to spend the rest of our fourth day in a further careful examination of the ferruginous conglomerate in the vicinity—but, as usual, without result.

Besides dividing the flints into irregular lumps and flakes, they can be grouped according to the original stones from which they came. In some instances this can be done with certainty, as, for instance, one stone was a peculiar flint breccia, of which we found three pieces; while in very many instances the likeness in colour between several pieces, even down to small peculiarities—such as pink spots or white streaks in the stone—is such that no reasonable doubt can be felt that they come, not only from the same stone, but from the same part of it. In two instances I have been able to fit pieces together, proving definitely that they were broken *in situ*, and in many other instances it is doubtful whether pieces do not fit. These facts seem to me to be against such extreme antiquity as is claimed for these flints by Dr. Noetling, and especially against the theory that they were once embedded in a stratum of rock or earth, and have been left lying on the surface by the wearing away of the stratum. To believe this one would have to believe that they were originally chipped up in Pliocene times, were subsequently covered up by sand to a great depth, the beds were then raised into a dome by pressure, and finally the pieces of stone were again exposed on the surface by denudation without any disturbance of their original relative positions!

But if the flints are not associated with the conglomerate, what are they? I would prefer that this question should be answered by those more competent to give an opinion, but Mr. LaTouche thinks they must be of considerable age, owing to the glaze on them, and suggests that they are palæolithic. On breaking two pieces, they were found to be light-coloured throughout, and not of the dull black colour characteristic of true flint;

but, following the outline of the pieces, there is a distinct "skin," or line of weathering, about one-sixteenth of an inch in depth, of a lighter colour, showing considerable lapse of time since the original stones were broken up.

In his 'Prehistoric Times,' Lord Avebury points out, on p. 329, with regard to flint flakes, that "those which have lain in siliceous or chalky sands are more or less polished, and have a beautiful glassiness of surface, very unlike that of a newly broken flint. In ochreous sand, especially if argillaceous, they are stained yellow, whilst in ferruginous sands and clays they assume a brown colour, and in some beds they become white and porcelaneous." Now, these pieces are nearly all either almost white or light cream-colour, though some are about the colour of honey; whereas, had they lain in the red band of conglomerate since it was deposited, they would surely have been much darker. As a matter of fact, in nearly every instance in which a piece of the exterior of the original stones is found, on a flake, it is seen to be yellow or orange, sometimes brown, and this might give a clue as to where they came from.

There is a plateau gravel at Yenangyoung which contains large rounded stones, but we could not give much time to searching in it for pieces of flint; and, though I picked up a piece by the side of a cart-track, I did not at the time connect it with flint chips, and threw it away, and was unable to find it again. There is apparently no reason why the lumps of chert found on the plateau should be brought from any distance over a mile or two to the spot where they were broken up, and a further search in the neighbourhood would no doubt disclose the source of them. Mr. LaTouche has taken a few of the pieces for microscopic examination as to their composition.

As I have already mentioned, Mr. Oldham and others regard the pieces found by Dr. Noetling, which are now in the Geological Museum in Calcutta, as natural; but, as an answer to this, in the year 1897, Dr. Noetling published, in the 'Records of the Geological Survey of India,' vol. xxx. part 4, p. 242, an article entitled "Note on a worn Femur of *Hippopotamus irravadicus*, Caut. & Falc., from the Lower Pliocene of Burma," in which he figured and described a very fine unbroken femur, exhibiting at both ends "traces of a peculiar kind of grinding." He says he

found it in a small streak of the conglomerate, about fifty feet above the ferruginous conglomerate (zone of *Hippotherium antelopinum*), and about a quarter of a mile north of where he found the flints. He says that it was no doubt *in situ* when found, and that it took some time to free it from its resting place in the bed. This find was made while he was mapping the petroleum field at Yenangyoung, and was mentioned by him for the first time in 1895, in his paper on the Tertiary system of Burma,* when he described the facets on the bone as a natural result; and said, "That side on which the bone rested was considerably rubbed, thus indicating the result of friction on the underlying sand produced by the gentle rocking of the bone by the waves while lying on the beach." Subsequently, in 1896, he saw a figure of a scapula of *Equus* which had been similarly rubbed down, and which Prof. Dames considered to have been rubbed by human agency, and, in his article in 'Natural Science,' in 1897—referred to early in this article—he first suggested that the bone he had found was probably an additional witness for the Tertiary origin of the chipped flint flakes, but he gives the layer in which he found it as being "fifteen to twenty feet, perhaps a little more," above the zone of *H. antelopinum*, instead of fifty feet, as stated in his article in 1897 in the 'Records.'

Whichever may be the correct distance above the bed, it is clear that, as the bone was pulled out of the layer in which it had up till then been undisturbed, there is no necessary connection between it and the flint chips which, as we now see, are to be found lying out on the plateau far above the conglomerate. In fact, if, as seems to me, the flints could not have come from this bed, the bone cannot possibly explain their origin.

Dr. Noetling says, in favour of this bone, that at any rate there is no similar wearing away of substance to be observed in any of the hundreds of specimens which he collected at Yenangyoung, nor in the collection of Siwalik remains in the Museum of the Geological Survey; so that "it is therefore beyond doubt that, whatever the verdict may be as to the origin of these curious facets, the specimen here described is at present unique."

I have already mentioned earlier in this article that on our first visit to Yenangyoung we found, among other remains, an

* 'Records of Geological Survey of India,' 1895, vol. xxviii. p. 77.

upper premolar of a small species of *Rhinoceros*. This specimen, which is being sent to the Natural History Museum at South Kensington, together with the collection made by Col. Nichols and myself at Yenangyoung and Mandalay, was brought to us at Twingon village by a Burman oil-well owner. Oil is the only industry there, and certain tracts are reserved for native owners to work by their primitive methods. They are not allowed to drill by machinery, but they dig wells and get oil at about three hundred feet. On asking whether they do not sometimes come across fossils, one man produced the above tooth, saying that he had found it at about one hundred and fifty cubits down, and he had never found anything else. The specimen is black, and beautifully polished from lying in the oil-sands, and on one side it had been rubbed down on some level surface, producing facets on three separate prominences. There is, however, no question in this case, as the man said he had rubbed it down himself to find out of what it was made. He apparently did not know it was a tooth, but kept it as a curiosity. I do not, of course, suggest that the femur was rubbed down in this way, but it is no longer unique; and, if Dr. Noetling is by any chance in error in supposing that it had not been previously disturbed when he found it, there is always the chance that it came by its peculiarities in this way.

Now as to this, surely the most remarkable thing about the bone is that it should have remained intact—that is, unbroken—in a stratum in which, so far as I know, all other bones are reduced to rolled fragments. The femur of a *Hippopotamus* is not a small bone by any means, and if such animals as *Rhinoceros perimensis* and *Hippotherium antelopinum* are represented in the conglomerate only by isolated teeth and fragments of bone, how comes it that this bone alone exists unbroken? And the difficulty is not made less by the consideration that this very specimen, thus curiously preserved, is found to be one on which Tertiary man has been exercising his ingenuity. I am aware that Dr. Noetling found it in a subordinate patch, either fifteen or fifty feet above the zone of *H. antelopinum*, and not in that zone itself, but he himself describes such patches as made up of "small pieces of drift-wood fossilized into hydroxide of iron, small pebbles of white quartz, or of a ferruginous claystone, and rolled

fragments of bones"; so that, if this description is correct, a complete Hippopotamus femur would seem rather out of place.

The numerous rolled fragments of bone found by us in and around the red conglomerate vary in size from the size of a finger-tip to half the palm of the hand, and throughout our search we found nothing like a complete bone. Before commencing this article, however, I wrote to Dr. Noetling, mentioning this difficulty, and asking what was his explanation of it; but, having received no answer, I can only conjecture that no very satisfactory one is forthcoming. It would appear to be not difficult to determine whether the rubbing down took place before the bone was fossilized or after, but Dr. Noetling does not mention that this test has been applied. Mr. LaTouche searched for the specimen in the Geological Museum, as Dr. Noetling was absent in Europe, but could not find it in the place where it should have been, and, as the latter gentleman, at the time of writing, is in Cashmir, there must be some further delay in finding it.

However, the bone at best is only useful in support of the flints, and if these have a different origin it cannot support them, but must remain as a solitary and inconclusive specimen.

That some sort of man existed in Burma—or, at any rate, in the Malay Peninsula—in Tertiary times is not only possible, but probable; but that the chipped flints and faceted bone are the work of his hands is, I think, a conclusion that is not warranted by the facts. The place where the flints were found would appear to be a palæolithic workshop, and as such is of great interest; but the vast difference between such a find and a discovery of specimens of the work of pre-glacial man is too obvious to require mention.

The photograph for this article has been kindly taken for me by the Rev. Charles Hodder, Town Chaplain, Mandalay.

Since writing this article, I have heard that some of the flint chips that were taken to England by Col. Nichols have, through the kindness of Col. Bingham, been submitted to Dr. Blanford, Prof. Bonney, and other expert authorities, and that they are pronounced to be of undoubted human origin.—R. C. J. S.

ON THE SPECIFIC VALIDITY OF *ANSER GAMBELI* (HARTLAUB), AND ITS POSITION AS A BRITISH BIRD.

By F. COBURN.

FULLY realising the great importance which attaches to the introduction of a new species of bird to the lists not only of Great Britain, but Europe as well, I have not committed myself to the following observations and conclusions without mature study, and shall treat the subject with a minuteness of detail befitting its character.

At the meeting of the British Ornithologists' Club in October, 1901, when I exhibited a series of my Icelandic birds, I also submitted my specimen of *Anser erythropus* (*ante*, 1901, page 317), and an almost completely black-breasted example of what I then thought was *A. albifrons*.

In my collection I have another specimen of this stage, which I secured from Co. Mayo many years back, and which has the whole under parts much blacker even than the former one, being a glossy jet-black, practically without any admixture of drab.

Both birds had been a puzzle since they came into my possession, and this largely influenced me in taking my specimen to London with *A. erythropus*, as I expected to find similar birds at South Kensington, and thus receive enlightenment. I was, however, much surprised to hear from the courteous authorities at the Museum that they had never before seen a specimen like mine! and that *A. albifrons* was not known to assume entirely black under parts. It was vaguely suggested that my specimen might be *A. gambeli*!

Subsequently, at the request of Mr. J. H. Gurney, I sent *A. erythropus* and this black-breasted bird for his inspection, also to be exhibited before the Norwich Naturalists' Society. Mr. Gurney expressed to me his opinion that this black-breasted bird might be *A. gambeli*, and has since published this view in

the able article, "On *Anser erythropus* and its Allies," in the current issue of the 'Ibis' (cf. 'Ibis,' 1902, pp. 269-275).

On studying this subject later, I found that there was much diversity of opinion amongst authorities as to the specific validity of *Anser gambeli*, the bird having been separated from *A. albifrons*, and so named by Hartlaub as far back as 1852; and, although his diagnosis has been questioned by several ornithologists, there appears to have been no real effort made to settle the point during all these fifty years.

I must confess that when I first examined the series of skins at South Kensington I was much puzzled, and felt that, with such a series, it would be extremely difficult to discriminate between the two species. I may here say that I consider the series in the National Collection to be inadequate and not a representative one, there being but very few specimens, mostly, if not all, in the winter condition of plumage. Although I have examined the series of both birds twice, they have afforded me very little assistance.

Later, I got together my entire series of White-fronted Geese, and have devoted the bulk of the past winter season to a study of this subject. I have been lucky in securing many examples to fill gaps in my series, and have now sixteen carefully selected specimens to work upon, these providing ample material in my judgment for proving two important facts, *viz.* the specific validity of *A. gambeli*—it must not be regarded as a subspecies—and its frequent occurrence as a British bird; the whole of my sixteen specimens of the two species having been received from the west coast of Ireland at different times.

Most authorities agree that the chief distinguishing characteristics between *A. albifrons* and *A. gambeli* are, the larger and heavier bill, and darker under parts of the latter. I have found other characters which I will state later; but, taking this longer, broader, and generally heavier-built bill as my guide, I could easily separate the two birds, and make a series of ten *A. gambeli* and six *A. albifrons*.

Unfortunately, I lack some of the connecting links in the latter bird; I have seen them in years past, and remember them well, but did not secure them, not knowing at the time that I was collecting two species of birds. I shall meet with those

connecting links later, and probably next season. One reason why my series of *A. gambeli* is so much more perfect than that of *A. albifrons* arises from the fact that, out of the great numbers of White-fronted Geese which have come under my notice, I have been in the habit, fortunately, of selecting only striking-looking birds, leaving the ordinary run to be secured at any time.

I shall now endeavour to show that these large-billed, heavily barred, or striking-looking immature birds should all be regarded as specimens of *A. gambeli*.

This series of ten specimens is a singularly, and I may say valuably complete one, ranging from the first plumage, through almost every grade, up to the breeding bird with glossy black under parts.

Now, it is in the two extremes—the immature and breeding stages—that it is most easy to discriminate between the two species, so far as plumage goes; in the intermediate or winter stage it is more difficult, as the student has then to rely mainly upon the differences in the size of the bill, a slightly longer tarsus, and, as my series shows, the distinctly lighter colour of the extreme outer wing coverts; this latter runs practically through the whole series, but perhaps too much importance must not be attached to it. There is another, and I consider very important osteological character, which I have discovered, and which cannot be detected unless the bird is in the flesh, but this I shall refer to in its proper place.

I believe that this similarity in the winter plumages of the two species—the stage most readily procurable by collectors—and the fact that there is no full, or in any way complete description published of the immature, or breeding stages, has led to much confusion, and caused the bird not only to be overlooked as a British species, but its specific validity to be doubted.

Because large-billed specimens have been procured in Great Britain, it has been concluded that they must belong to *A. albifrons*, and therefore that this bird has sometimes a bill quite as large as *A. gambeli*. If those British-killed, large-billed specimens in various collections were admitted, as they should, to be *A. gambeli*, much confusion would have been avoided.

My series demonstrates clearly the very important fact that the immature conditions of the plumage in *A. gambeli* are quite

distinct from the same stages of *A. albifrons*; and, as I have before said, I can find no proper description of these stages, it will be necessary in proving my case to publish a full but brief description of these and the other leading features in my two series of birds. I ought perhaps to say that the stock of books available to me here is limited—I particularly lack American works—and I should like it to be understood that I do not positively assert that no proper description of these stages of plumage has ever been published, but that I cannot find any.

Anser gambeli.—Immature male, first plumage. Shot Co. Galway, end of November, 1895.

The immature plumage of any of the Wild Geese may always be known by the small size of the feathers clothing the body; in first plumage the feathers are not half the size of those of an adult bird. The feathers gradually increase in size as the bird advances towards January and February. With the growth of these feathers there is a change in the colouring matter, independently of a moult. But when the black feathers begin to appear on the breast, they are frequently, but not always, newly moulted feathers. I have plenty of evidence showing the black colouring matter being transmitted into drab feathers; indeed, this deposition of the black pigment goes on slowly until the whole under parts become jet-black. In the case of the immature birds, of *A. gambeli* especially, advancing towards maturity, it is first a gradual *extraction* of the dark colouring matter from the feathers, eventually leaving the breast and under parts almost if not quite white; then the full drab colour of the adult bird gradually deepens, and with it the black colour begins to appear. As I have before said, these changes are accompanied by a moult, and probably by the time the breeding period comes round the whole body has been clothed in new feathers.

I have given these general facts here, as it will be necessary to keep them in view in connection with the following descriptions.

The general appearance of this bird's first plumage is a very dark blackish brown; but compare this first plumage with the black-breasted breeding stage, and it is easy to see that this young bird belongs to a parent who finds black under parts useful to it as a protective colouring during the breeding season.

As the same conditions of environment prevail when the young bird has got his first feathers to those of the breeding period, it is equally necessary for the young to be darkly clad. We find plenty of instances of this in the cases of the various kinds of Ducks, Guillemots, Razorbills, Dunlins; and other shore birds, where the first plumage after the downy stage closely resembles that of the adult breeding-dress.

The whole of the under parts, then, in this young bird, from the breast to the abdomen, are a deep blackish umber, fringed with pale drab. The flanks not quite so dark in colour, but fringed with a darker drab. The mantle is dark umber, with pale, faded brown margins; rump very dark umber; upper tail-coverts—central ones dark umber, fringed with dirty white; outer ones dark umber on one side of the rib, dirty white the other. Tail blackish umber, margined with dirty white. The forehead extending to the eyes; loreal region and front cheeks a dull black, with a few indistinct white feathers scattered around base of bill and forehead; the rest of the head and neck a dark drabish umber, darkest on top and back of neck; the front lower neck a lighter drab. The wing-coverts graduate from the slaty drab of the extreme outer ones to the blackish umber of the medians, faintly fringed with paler; the primary coverts are a slaty umber, broadly margined with white. Primaries blackish umber, with white shafts; secondaries almost black with a very delicate hair-line margin of drab. The alula and base of primaries slaty drab. Abdomen and under tail-coverts dull white. The legs, toes, and webs a pale chrome-yellow, with a tinge of umber. Bill a dirty whitish yellow with a few streaks of blackish on ridge and side. Nail whitish at base, blackish at end streaking into the white. Iris dark hazel; eyelid brownish yellow.

Length $29\frac{1}{2}$ in.; weight 5 lb.; bill 1.98 in.; tarsus 2.75 in.; wing $15\frac{3}{4}$ in.

Anser albifrons.—Immature male, just beginning to pass from first to second stage. Shot Co. Mayo, January, 1892.

It is a pity I have not got the absolutely first plumage of this bird; however, the only traces shown of the second stage are a few large feathers on the flanks, and a larger sprinkling of white on the forehead; it may practically be taken as a first-plumaged

bird, and it at once gives us a totally distinct-looking appearance to the first specimen or any other immature stage of *A. gambeli*. Here we have a bird whose parents do not require entirely black under parts for the breeding period! The whole of the under parts, from the breast to the abdomen, are a pale stone drab fringed with lighter, and becoming almost white towards the abdomen. None of these feathers shows the slightest traces of having had the dark colouring matter in them which is to be found up to the fourth stage in *A. gambeli*. The flanks are a darker drab with pale margins. The mantle is pale umber margined with drab. Rump blackish umber; upper tail-coverts much paler than in *gambeli*, being a washy brown and dirty white. The tail is very like that of *gambeli*, but a paler tint of dark umber. Round the base of the bill and under the throat a fair space of dirty white feathers interspersed with blackish ones; forehead and front cheeks blackish, but in no way as dark as the other bird; head and neck a dark rusty drab, darkest on crown and back of neck. Outer wing-coverts slaty drab, gradually darkening into deep umber margined with paler of the medians, and slaty drab broadly margined with dirty white of the first coverts. Primaries dark umber but with a light hoary shading, secondaries nearly black. Alula and base of primaries a hoary slate. Abdomen and under tail-coverts dirty white. There was not sufficient difference in the colours of soft parts in these two birds to induce me to make special notes, and I find that in my manuscript book which I keep for recording colours of soft parts the one description answers for both birds; but the legs and bill look much paler now than those of the first specimen. The ridge of the bill shows traces of dark markings, and the nail is partly brown and dirty white. I did not take length and weight of this bird before skinning. Wing 15 in.; bill 1.85 in.; tarsus 2.45 in.

Anser gambeli.—Second, third, and fourth stages. From birds shot in Clonmel and Galway, November, 1901, February, 1895, and January, 1902.

I can now take these three stages more briefly. In the second stage—male—one can unmistakably see the commencement of the fading away of the dark colouring matter which

characterises the first plumage. In this bird the under parts have become a dirty-looking umber; on the upper part of the breast there are a few feathers left marbled with blackish umber, these alone showing clearly enough that it is a case of the extraction of the dark colouring matter. The upper breast is drab, with the edges of the feathers worn and abraded-looking. The flanks have a few of the dark large new feathers coming, bordered with dull white. The general appearance of the upper parts is paler than in first plumage, the bill is clearer, and the nail nearly all white. Bill 2.13 in.; tarsus 2.65 in.; wing 15½ in.

In the third stage the under parts have now assumed that appearance which the Americans call "speckle belly," the dark markings having so far faded away that the centres only of the feathers remain dark, making the under parts look as though speckled all over with dark umber. It is not necessary to describe any other portions of this bird's plumage, excepting that there is scarcely a trace of white at the base of the bill, and the blackish has a rusty look.

Male.—Length 28¾ in.; wing 16 in.; weight 5½ lb.; bill 2.13 in.; tarsus 2.93 in. The nail on bill is entirely dark.

The fourth stage is very interesting; it is still a "speckle-belly," but the clean-looking new greyish drab feathers are appearing on the upper breast and amongst the under parts, which are becoming almost white, while some of the old feathers have almost entirely lost the dark centres, giving a much whiter appearance to the under parts, which makes the speckles show up more distinctly. The flank feathers are well grown, and have broad white outer margins. The upper tail-coverts have become almost entirely white. There is a good space of white at the base of the bill, which is clearer yellow with the nail partly white. In the wing this bird shows the paler slaty drab outer wing-coverts, which runs through the rest of the series, becoming palest in the black-breasted adults, and in this differing distinctly from the adults of *A. albifrons*.

Male.—Length 28½ in.; wing 16½ in.; weight 5½ lb.; bill 2.1 in.; tarsus 2.95 in.; neck 8¾ in.

Anser albifrons.—Fourth stage. Shot, Galway, February 8th, 1902.

It will be observed that I lack stages two and three in this bird. But my first specimen gives me first and some of the second characters, while the present, which is a very interesting bird, gives me the fourth and some of the fifth. Compare this bird with the fourth stage of *A. gambeli*, and the general tone of colouring will be found to be quite distinct. Instead of the under parts becoming almost white, as they do eventually in the larger bird, in this they are a stone drab down to the abdomen, which is certainly a very important distinction. On the under parts there is a moulted black feather here and there, drab ones with the black colouring being thrown into them, and a few with the darker drab of the first plumage not all extracted. *There is no trace of this bird ever having been a "speckle-belly."* On the head and neck there is more of a slaty tinge. The mantle and outer wing-coverts are much darker. There is a broad space of white at the base of the bill, which also extends low down under the throat; but there may be a tendency to albinism in this bird, as there are a few white feathers scattered on the neck; nevertheless, it is as well to point out that the white extends under the throat in the first plumaged bird, but is not traceable in any of the immature specimens of *A. gambeli*.

Female.—Length 26 in.; weight $4\frac{1}{2}$ lb.; wing 15 in.; bill 1.80 in.; tarsus 2.52 in.; neck $7\frac{1}{2}$ in.

Anser gambeli.—Sixth, seventh, eighth, and ninth stages. Shot, Galway, February 14th, 1902; January 20th, 1902; February 19th, 1902; and Mayo, January 18th, 1892.

In the fifth stage of this bird, which I miss in my series, but am well acquainted with, the whole of the under parts have become a dull white, with a black feather showing here and there.

In the sixth stage the drab colouring matter—now pale—has been thrown into the previously white feathers of the under parts; large patches and broken bands of black are appearing as the result of moult combined with the deposition of the black pigment. It appears to me that up to this sixth stage the bird

has got new feathers on all parts of its body, so that all the important subsequent changes are a result of the continued deposition of the colouring matter into the feathers. In this specimen there is an extraordinary amount of white on the front of the head extending beyond the commencement of the eyes. Dissection proved it to be an immature male.

Length 28 in.; wing $16\frac{1}{2}$ in.; weight 5 lb. 2 oz.; bill 2.17 in.; tarsus 2.91 in.; neck 9 in.

Seventh stage. The drab of the under parts has become more pronounced, while the black has greatly increased, and now forms almost unbroken bands across the lower parts; great numbers of the drab feathers have the black pigment being thrown into them.

Adult male.—Length 29 in.; wing 18 in.; weight 5 lb.; bill 2.24 in.; tarsus 3.0 in.

In all these four stages the colour of the soft parts is much deeper than in corresponding stages of *A. albifrons*, being of a distinct deep reddish orange. In some the entire bill is a bright orange scarlet, the nail also being suffused with red while the bird is quite fresh. The brilliancy of colour in the legs and bill appears to increase as the bird nears the breeding stage. Tongue and inside mouth white. Eyelid yellowish umber.

Eighth stage. All that need be said here in connection with this bird is to note the largely increased amount of black on the under parts, which extends almost to the vent, and has ceased to form bars; they are great patches with drab feathers interspersed.

Female.—Length $27\frac{1}{2}$ in.; weight (a thin bird) $4\frac{1}{4}$ lb.; bill 2.1 in.; tarsus 2.75 in.; wing $16\frac{1}{2}$ in.; neck 9 in.

Ninth stage shows a still further increase of black on the under parts, and leads up directly to the final two breeding birds.

Female.—Length and weight not taken; wing $17\frac{1}{2}$ in.; bill 2.1 in.; tarsus 2.85 in.

Anser albifrons.—Sixth, seventh, and eighth stages. Shot, Galway, January 25th, 1902; January 14th, 1902 (two).

In the sixth and seventh stages of this bird it is very evident that the under parts had become much paler than in the fourth

stage before the black colouring matter began to appear; but in no case anything near as white as in *gambeli*. In the seventh stage the drab is appearing, in the eighth it has increased in intensity, as have also the black markings. In all these three the black markings are much less than in the *gambeli* series, and in all cases completely broken by the drab feathers. In this it will be seen that my observations agree perfectly with those of other writers. In all these birds the outer wing-coverts are much darker than in the series of *gambeli*.

The legs and toes are a bright orange yellow. Bill pale livid yellow. Nail shining white with a tinge of slate. Iride dark hazel, and eyelid *dark drab*. The measurements and weights of these I give in order:—Length $27\frac{1}{2}$ in.; wing $16\frac{1}{4}$ in.; weight $5\frac{1}{4}$ lb.; bill 1.85 in.; tarsus 2.60 in.; neck $7\frac{1}{2}$ in. Length $27\frac{1}{2}$ in.; wing 16 in.; weight $5\frac{1}{4}$ lb.; bill 1.80 in.; tarsus 2.60 in. Adult female: Length 27 in.; wing $16\frac{1}{2}$ in.; weight $5\frac{1}{2}$ lb.; bill 1.80 in.; tarsus 2.65 in.

Anser gambeli.—Tenth and eleventh stages. Shot, Co. Mayo, February 6th, 1901, and February, 1894 ?.

It remains now to describe the two last and most important stages in this bird. The breeding bird with entirely black under parts is exceedingly rare in collections, and I think has never been fully described, even by American writers! Audubon ('Birds of America,' vol. vii. p. 209) had evidently heard of such a plumage but not seen it, as he says: "Feeling pretty confident that in summer the lower part of the body becomes pure black." Dr. Elliot Coues ('Key to North American Birds,' p. 684) says, "in high plumage perhaps mostly black," so that he had never seen the bird, and probably only copied Audubon's indecisive remarks. The only references I can find amongst British writers are in Ussher's 'Birds of Ireland,' p. 170, and the late John Cordeaux in 'British Birds, their Nests and Eggs,' vol. iv. p. 591, who refers to a specimen in the collection of Mr. G. H. Caton Haigh; but both writers regarded these birds—which were obtained from Ireland—as being *A. albifrons*. If Mr. Ussher and Mr. Haigh will kindly examine their specimens, they will probably find that they are of the large-billed race.

In treating of the ninth stage I said that the black had increased so much that it led directly up to this tenth stage. In this the black covers the whole of the under parts and flanks from the lower neck to the abdomen, being interspersed here and there only by a single drab feather; the flanks show most drab, but it can easily be seen that the black colouring matter is being passed into these feathers. The other portions of the bird, from the head to the mantle, have also become much darker, but the outer and greater wing-coverts have become of a paler slate, while the median coverts are darker than in preceding specimens. Length $26\frac{1}{2}$ in.; wing $15\frac{1}{2}$ in.; weight 5 lb. 2 oz.; bill 1.95 in.; tarsus 2.62 in. In the eleventh stage it need only be said that the black has still further intensified, become more glossy, extends entirely over the flanks, the outer feathers of which have broad white margins, and that there is only just a trace of drab left. It is quite certain that if the bird had lived a few weeks longer there would not have been a solitary trace of drab left.

It is quite clear to me that these birds select for their breeding site a spot where there is *black sand and scattered lumps of black lava with portions of the surface weathered drab!* just such spots as I found in Iceland (*ante*, 1901, p. 409), and which are also to be found in any volcanic area in the far north. Here, by throwing themselves into that upright attitude which I saw the Greylags (*Anser cinereus*) do, they would make themselves look, even from a short distance, exactly like weather-beaten lumps of black lava. The white front to the head is of the highest value to the bird for protective purposes, as it shines conspicuously, but is comparatively such a small speck, and terminates so abruptly by reason of its black border, and then is so softened down by the red bill that you cannot associate it at first sight with a living creature; and so it completely distracts attention from the sombrely clad body of the bird! Thus we see that what appears to us—if we examine a cabinet specimen or an illustration—to be a glaringly conspicuous mark for betraying the bird, is utilised by nature as a potent factor for the bird's protection at the most important period of its life!

Adult female.—Length and weight not kept; wing $15\frac{3}{4}$ in.; bill 2.12 in.; tarsus 2.65 in.

I have given the descriptions of the two species alternately, so that the various plumages may be more readily compared.

Any ornithologist looking at the series of *A. gambeli* when they are placed side by side in a row, with their breasts all forward, could never doubt that they all belonged to one and the same species, judging by plumage alone. Upon scrutinising the series of *A. albifrons* under similar conditions, it is also equally clear that they belong to one and the same species, and that those species are distinct and easily separable. Turn all the birds round and examine the outlines of the bills, and the difference will be seen to be very striking. When one's eyes become thoroughly accustomed to these outlines, it is perfectly easy to separate the species by bills alone.

I now come to a very important point. I have said that I have discovered a further valuable osteological distinction: it is that the *neck* in *A. gambeli* is about $1\frac{1}{2}$ in. longer than in *A. albifrons*.

Up to January last I had secured all my specimens singly, and had not noticed the difference in the length of neck; but in that month I was fortunate enough to get two specimens at one time—an immature *gambeli* and adult *albifrons*, and when the two birds were lying before me I was instantly struck by the extraordinary difference in the lengths of their necks. After skinning the birds and dislocating the necks at the base of the skull, the measurements were:—Adult *albifrons* $7\frac{1}{2}$ in., and immature *gambeli* 9 in. I should not have attached too much importance to this single instance, but I was enabled during February to abundantly corroborate this evidence by getting two adult *gambeli* which gave me necks of $8\frac{3}{4}$ in.* and 9 in.; also another adult *albifrons* with a neck $7\frac{1}{2}$ in.

I think, in the foregoing remarks, I have given abundance of proof in differences of plumage and osteological characters already well known to fully establish the distinctions between the two birds; but the final discovery ought surely to be all that is required to prove the specific validity of *Anser gambeli*.

It will perhaps be useful to give here, in tabular form for easy comparison, the measurements and weights of the various specimens:—

* Injured by shot.

<i>A. gambeli.</i>							<i>A. albifrons.</i>						
Stages.	Length.	Weight.	Wing.	Bill.	Tarsus.	Neck.	Length.	Weight.	Wing.	Bill.	Tarsus.	Neck.	
	IN.		IN.	IN.	IN.	IN.	IN.		IN.	IN.	IN.	IN.	
1	29½	5 lb.	15½	1.98	2.75	—	—	—	15	1.85	2.45	—	
2	—	—	15½	2.13	2.65	—	—	—	—	—	—	—	
3	28¾	5½ lb.	16	2.13	2.93	—	—	—	—	—	—	—	
4	28½	5½ lb.	16½	2.1	2.95	8¾	26	4½ lb.	15	1.80	2.52	7½	
5	—	—	—	—	—	—	—	—	—	—	—	—	
6	28	5 lb. 2 oz.	16½	2.17	2.91	9	27½	5½ lb.	16½	1.85	2.60	7½	
7	29	5 lb.	18	2.24	3.0	—	27½	5½ lb.	16	1.80	2.60	—	
8	27½	4½ lb. (thin)	16½	2.1	2.75	9	27	5½ lb.	16½	1.80	2.65	—	
9	—	—	17½	2.1	2.85	—	—	—	—	—	—	—	
10	26	5 lb. 2 oz.	15½	1.95	2.62	—	—	—	—	—	—	—	
11	—	—	15½	2.12	2.65	—	—	—	—	—	—	—	

It will be seen from this that *A. gambeli*, taken all round, is a larger bird, with a proportionately much longer neck, than *A. albifrons*. Add to this a yellowish umber eyelid against dark drab, and reddish orange legs and bill against orange yellow legs and pale livid yellow bill.

I will here again refer to Mr. J. H. Gurney's paper above cited, and say how thoroughly I agree with him in his contention that all three White-fronted Geese should be treated as distinct species. I have already said sufficient with regard to the two larger ones; but now place my *A. erythropus* amongst the whole of the specimens, and it stands out instantly and conspicuously as distinct from all.

Mr. Gurney refers to *A. erythropus* having been described as being no larger than an Eider Duck, or even a Mallard. This is quite right so far as length and weight goes, for I have had Eider Ducks 5½ lb. weight and length 28 in., measured to the toes, and Mallards 4 lb. with length exceeding 22 in., but the comparison goes no farther than this. This Eider of 5½ lb. and 28 in. long exceeds the length and weight of the largest specimen of *A. gambeli*, but it does not look as large as *A. erythropus* of 4½ lb. The fact appears to be overlooked that the feathers clothing the body of an adult Wild Goose are *very much larger* than those on the body of an Eider Duck, which makes the former look conspicuously larger than the latter. Those writers who describe the lesser White-fronted Goose as being about the size of a Brent Goose make a far more commonsense comparison. My specimen of *A. erythropus*, which weighed 4½ lb., was a very plump, indeed quite fat, bird; in the normal condition of flesh in the breeding season I can quite understand that it would

weigh 4 lb., or even under, which was the weight of Mr. Popham's bird shot on the Yenesei. Mr. Chapman's bird at $2\frac{1}{2}$ lb. was obviously in very poor condition.

Finally, it only remains now to discuss the probability of *Anser gambeli* crossing the Atlantic to the west coast of Ireland, or coming by some other route. I will at once and most emphatically express my opinion that there is nothing in the faintest degree unreasonable in suggesting that they can and do accomplish this journey easily and regularly. But we all know that these birds breed in the high north, and my own investigations in Iceland proved to me that White-fronted Geese only rest regularly there during the migratory period; which species I cannot say, but as likely to be *gambeli* as *albifrons*. Instead of the across Atlantic journey, it is more reasonable to assume that these birds come across Greenland—even if they do not breed there—to Iceland, and could then easily continue their journey downward, fringing the narrowest part of the Atlantic to Ireland. If Greenland and Iceland Falcons and so many other northern birds do it regularly, why not the powerful flying Wild Geese? If the Snow Goose (*Chen hyperboreus*) comes, why not *A. gambeli*? For my own part I should not doubt that they could easily cross even the broad part of the Atlantic.

The scepticism which has for so many years been indulged in with regard to American migrants visiting Great Britain must surely be utterly swept away now by the fact of so many American birds visiting our islands. The fanciful assisted passage theory is utterly inadequate to explain it, although it is perfectly certain that some birds do rest on vessels at sea, and travel with those vessels for a time, as instances have come under my own notice. But these occurrences are in no way sufficiently frequent to account for the great and increasing numbers of American birds which are coming to us—especially amongst the Waders. Even Yellow-billed Cuckoos and Carolina Crakes are just as genuine migrants as Snipe-billed Sandpipers, American Bitterns, Spotted Sandpipers, or American White-fronted Wild Geese.

There is one fact which all must admit, which is that of late years some birds are changing their lines of migration; further, that, in many instances, those birds breeding in the far north do

not all take one line of migration for their winter quarters, but some go east, others come west. Take for instance the case of the Snow and Lapland Buntings; great flocks of both these species make for the American Continent, whilst other flocks come to us. What one species of bird will do, others will also; and is there anything unreasonable in suggesting that some flocks of *A. gambeli* make for the American Continent, while others come to our shores? It will, I think, be but reasonable to look for more American bird visitors in the future.

When we can obtain the services of some competent field naturalist who thoroughly understands the differences in the notes of birds, and who will have an opportunity of studying both *A. albifrons* and *A. gambeli* at their breeding haunts, we shall probably find that the habits and the notes of the two species are distinct. I quite understand the difficulties of studying the breeding habits of these birds, in consequence of the high northern districts selected by them for nidification being almost inaccessible to most naturalists, but I will urge that anyone whose good fortune it may be to pass a season in these regions can render a great service to ornithology by paying particular attention to this subject.

Before concluding this paper, I ought perhaps to say a few words of explanation upon two subjects I have touched upon during the progress of my arguments, *viz.* the power possessed by birds of *extracting from* and *transmitting to* their feathers colouring matter. The latter—colour change independent of a moult—has been dealt with by several writers latterly, but, in my judgment, not thoroughly. It will be seen that my views are very strong on the point—they have been so for a good many years past—and I have accumulated a mass of evidence which appears to me to place the matter beyond doubt; nevertheless, an intelligent study of the case of the White-fronted Geese alone ought to be sufficient to satisfy even our American friends. The former case—extracting the colouring matter from the feathers—is, I think, new. This point also I have not broached without due consideration, and during many years' study have amassed evidence of a most conclusive character. I formulated my views in a paper as far back as 1896, but for certain reasons did not allow it to be published at the time, and have since been too much occupied with other matters to revert to it.

NOTES AND QUERIES.

AVES.

Birds in the Valley of the Namsen. — The Namdaleners—and, indeed, all Norwegians—take great care of their birds, except those that are inimical to their interests; so that one derives immense pleasure in roaming through the fir-woods and alder-bushes by the river side. The birds are so tame—Magpies and Hooded Crows especially—that one experiences quite a new joy in being able to observe their characters and habits so near at hand. Then again we experience once more the youthful thrill of delight on finding such nests as those of the Fieldfare and Redwing, winter visitants whose breeding haunts and habits have always hung dimly in the regions of mystery. The above-mentioned Crows abounded; I counted sixty Hoodies crossing the river together as they flapped away to roost; and, indeed, became an unmitigated nuisance in the early morning, when they held high parliament outside my bedroom window. Hazel-grouse (yerpe) flushed in desultory coveys like Partridges from the alders and fir trees; and once, while speeding through the lovely fern-clad, moss-carpeted pine woods to the daily Salmon fishing, I hopped into the very midst of a splendid covey of Capercailie, quite tame, within ten yards, and they simply whirled heavily away into the nearest fir trees, not in the least alarmed. The monotony of broad still river was relieved by many pairs of Mergansers passing up and down, or in the evening shooting out across the stream, with their trip of downy-lings, to the shallows on the opposite shore, where they will eat Salmon-parr to their hearts' content. Black-throated Divers, too, were there in plenty, very busy fishing, and mewling over their ill-fortune, or flying away with weird croakings to their romantic breeding haunts far away in the hills. It seems a pity that government grants are offered for all these birds, though I am bound to confess that I took six Salmon-parr, two inches long, from the throat of one little "'Ganzer.'" Fortunately, however, the one crower offered, in the case of the Divers, takes a deal of earning. It cost me ten, and I failed to secure the government grant after all. A price is set, too, upon all birds of prey, the unhappy Buzzards, which do no harm to the farmers

and an incalculable amount of good, suffering the most, since they are easiest to secure. One pair were accused of killing Capercaille and Ptarmigan, and their death-warrant signed; so I went off to the hills to secure pictures of the nest and specimens of the birds. The nest was full of *débris* of Mice—Bank-Voles chiefly; one lay uneaten on the sticks. But, though I rigged up a chicken in a most tantalizing manner to try and secure the male bird, neither the cock nor hen, who kept howling from the top of a fir tree, would look at it. The farmer became less convinced as to their destructive propensities, but still eight croners for the four birds form a strong inducement to them to send in the claws to the local *landsman* (policeman).

Of other birds, one noted the Brambling, Norfolk Plover, Green-shank, Common Sandpiper, Curlew, Grey Plover, Spotted Flycatcher, Heron, Marsh Tit, Swallow, House and Sand Martin, Redstart, Whinchat, Willow-Wren, and many others; while the note of the Great Black Woodpecker was frequent in the hill-forests, though I never had the luck to see one. The Cuckoo, too, was in full song in July. One could have wished that the pursuit of ornithology had been one's only pastime; but, since we had travelled for a whole week to catch Salmon, our backs had to be turned resolutely on the woodland glades.—FREDK. PICKARD CAMBRIDGE (Wimbledon).

The Two-barred Crossbill in Nottinghamshire.—I was delighted to be able to add a new bird to the Nottinghamshire list, *viz.* the Two-barred Crossbill (*Loxia bifasciata*). When in Southwell (the smallest city in England, and which contains one of the most beautiful cathedrals), I called on Henry Schumach, the talented taxidermist. I found him going over an old box of birds preserved by his late father, and amongst them at once "spotted" this rare British visitor. I asked him about it, and he said: "I remember it being shot very well by Mr. Emery, butler to the late Mr. Wyld, of Southwell. He saw it in some big old Scotch firs in the grounds, and shot it, and brought it to my father, to whom he gave it." I then asked him why his father had never mentioned it to me or others. He said he thought it must have been an escaped cage-bird, so stuffed it to put in a case some time, but had never done so. He was at home when the bird was shot, and saw it in flesh when brought in. I had a good look at it; the claws were sharp, and plumage good; legs a bit shattered by shot. I have secured it for my collection, and shall value it as a rare British bird.—J. WHITAKER (Rainworth, Notts).

Girl Bunting in Ireland.—On Saturday, August 2nd, within half a mile of Dunfanaghy, Co. Donegal, I watched for some time an adult

specimen of the Cirl Bunting (*Emberiza cirlus*). The bird was on some gorse by the side of the road, and allowed me to remain about ten yards away, sufficiently long to point out to my wife—who was with me at the time—the difference between it and *citrinella*. I may add that the Cirl Bunting is a bird with which I am very well acquainted, and in this case was first attracted by its note. This appears to be the first record for Ireland.—H. E. HOWARD (Clareland, near Stourport, Worcestershire).

Cirl Bunting in Carnarvonshire and Cardiganshire.—In reference to the occurrence of the Cirl Bunting (*Emberiza cirlus*) in Carnarvonshire, recorded by Mr. Aplin (Zool. 1899, p. 322), it may interest him and others to know that this bird is by no means uncommon in that part of the county near the Little Orme. During a short stay in the neighbourhood in July, I heard and saw five males within a radius of one mile. One afternoon two birds were singing together in a churchyard, within a few yards of each other; one was perched on the east gable of the church, the other in a yew tree. Close at hand I also found a nest, which by July 16th contained three eggs. This nest, chiefly composed of hay, grass, &c., was built in a hedge bordering a lane, amongst blackthorn, brambles, &c., and, as is usually the case—so far as my experience goes—placed on the field side of the hedge, and invisible from the lane. Another nest, out of which the young had just flown, was built in an isolated bit of gorse in a hedgerow, also bordering a lane. Curiously enough, immediately under this nest, but in the bank and next the lane, there was a Yellowhammer's nest with four eggs, showing that the two species do agree together at times. With regard to the song of the Cirl Bunting, it may not be generally known that the same bird will sometimes alter its usual loud trill to a much sharper and higher key. Its call is somewhat remarkable and unmistakable, being a very thin sibilant note repeated at intervals. There is another alarm-note, uttered occasionally by the male, which is identical with that of the Hedge-Sparrow; this note I heard when handling the young, with the old bird within a few yards of me. Again quoting Mr. Aplin: in his interesting and valuable paper on the distribution of this species, he mentions Aberystwith as the only locality in Cardiganshire where it has been observed. I may here say that on July 18th, 1901, I heard several singing at and near New Quay in Cardiganshire.—S. G. CUMMINGS (King's Buildings, Chester).

Notes on the Cuckoo in Aberdeen.—The season here has been very bad for *Cuculus canorus*. It was first heard on May 4th, but only a

solitary bird up to the 9th. I have a record of hearing the note of these birds up to about June 28th, and they were seen up to August 7th. I saw a solitary bird as late as August 25th; it was a slate-coloured example, and seemed to be an adult from its appearance. I observed the first young one on June 5th. There were a few young about, exhibiting the usual variety in the colour of the plumage. In fact, there might be as many young as usual, but certainly no permanent increase in numbers as was observed in former seasons. A favourable season next year might lead them on a little further, for the adults were not numerous, and, owing to the cold weather, many may have remained in a milder climate than here. The Twite (*Linota flavirostris*) was still the only foster-parent; while I failed to get any further particulars as regards the movements in connection with the young of the foster-parents.—W. WILSON (Alford, Aberdeen, N.B.).

Sooty Tern in Lancashire.—I have recently had an opportunity of examining a Sooty Tern (*Sterna fuliginosa*) in adult plumage, which is said to have been found alive in Hulme, one of the most densely populated districts in Manchester, on the 9th of October, 1901. The bird is in the possession of a man named Nuttall, who told me that when passing along Denbigh Street soon after dawn, in pursuit of his calling as a "knocker-up," his attention was attracted by a black and white bird, which was lying on its back, and struggling feebly. Nuttall, who takes some interest in birds, has at different times picked up dead or exhausted migrants in the streets in the early hours, and has a small collection of birds which he has shot on the outskirts of the city. In the dim light he mistook the Tern for a Lapwing which had come to grief among the telegraph-wires, but a closer examination showed it to be "some sort of Sea-Swallow" with which he was unacquainted. The bird died in his hand, and the local taxidermist to whom he took it was unable to name it for him. When skinned it showed no sign of injury, but proved to be in very poor condition, and had apparently died from exhaustion after buffeting with the boisterous weather which had culminated in a gale from the south on the night before it was found. After it had been set up it was exhibited at a meeting of the British Ornithologists' Club on Nov. 20th, by Mr. Howard Saunders. It is a matter for regret that the Tern was not submitted in the flesh to some competent authority, but its history as related to me by Nuttall and the man who stuffed it appears to be quite satisfactory.—CHAS. OLDHAM (Knutsford).

Erratum in last Issue.—Note on "Breeding of the Bittern in Herts" (*ante*, p. 316). For "John Wobley" read "John Wolley."—FRANCIS C. R. JOURDAIN (Clifton Vicarage, Ashburne, Derbyshire).

REPTILIA.

The Habits of the Grass-Snake (*Tropidonotus natrix*) in Confinement.—This species, besides being very easily procured, is very hardy, and not nearly so subject to canker in captivity as are some of the continental species. Out of about twenty-five specimens I have had in my possession, only one has died of this disease, and that one through being put into an infected cage.

The Grass-Snake, or Ringed Snake, when frequently handled, soon becomes tame, and hardly ever attempts to bite. There are certainly two or three instances recorded where it has done so; and I myself was once bitten by one, but it is certainly of very rare occurrence. The food of this snake undoubtedly consists of frogs and small fish, and very rarely toads, and some of my snakes will frequently take minnows out of my fingers, while I have often induced them to take a dead minnow by moving it about in their front. The Grass-Snake is said to eat the eggs of birds, but, although this may be the case, I have never been able to induce my snakes to eat them in captivity. The Grass-Snake will frequently breed in captivity, and in some cases incubate her eggs. One specimen I had two years ago laid sixteen eggs shortly after she came into my possession, but subsequent to their deposition she took no more notice of them. These eggs were all separated from one another, and this, I think, is rather unusual, as they are generally joined together in a string by a glutinous substance.

The Grass-Snake is very fond of water, and is an excellent swimmer. It should therefore, while in captivity, be provided with a large pan of water, in which it will frequently remain for a considerable time completely submerged, with the exception of the head; one of my specimens whilst casting its skin this summer remained in the water for more than ninety-six hours.

As regards the sloughing of this species, I have noticed that it is much less frequently done than in other European species. Many of the latter—such as the Dice, Æsculapian, and Leopard snakes, which I have kept—have cast two or three times between the months of April and September; whereas many of the Grass-Snakes have not cast at all during this period, not even after passing the winter in confinement in a state of semi-hibernation.—B. J. HORTON (305, Stratford Road, Sparkbrook, Birmingham).

NOTICES OF NEW BOOKS.

Atlante Ornitologico. Uccelli Europei, con Notizie d'Indole Generale e Particolare. Del Dr. E. ARRIGONI DEGLI ODDI.
Milano : Ulrico Hoepli.

THIS massive and beautiful volume is an addition to the series known as 'Atlanti Diversi per la Gioventù Studiosa,' editi da Ulrico Hoepli. It is written by an ornithologist who is not a stranger to these pages, and, published in a moderately cheap form, with a wealth of illustration, supplies a good handbook for the study of continental ornithology. The first section to p. 165 constitutes a general introduction to the subject, and refers to general structure, mimicry, dimorphism, hybridity, geographical distribution, migration, and classification, among other subjects; while an exhaustive bibliography is also appended. Five hundred and sixty-five species are descriptively enumerated, fifty coloured plates are given, and many blocks illustrate the text. The three concluding plates are devoted to eggs; the other plates each contains a number of birds, arranged in a somewhat ancient style, and not quite approaching the record form in either chromo-lithography or coloured photography of to-day, but still of a useful nature for recognition: iconographic more than absolutely artistic.

The author, however, has brought his letterpress thoroughly up to date. A knowledge of the Italian language, so far as descriptive phraseology is concerned, is not a difficult acquisition, even for those to whom Dante and Tasso in the original are sealed prophets. We English, as a rule, are perhaps the worst linguists in the world, and are meek before our own hairdressers and restaurant waiters, who are probably, in a colloquial sense, the best. We may find some solace in the reflection that the men who really know their own language are incomparably fewer than those who have a facile smattering of other tongues, and that to all inheritors of Babel the key to scientific diction is not a too difficult quest. There is sometimes a Sir R. Burton—but

seldom. We write thus because the author of this book is really worth reading, and the difficulty of doing so to the most parochial Anglican is not insurmountable.

The lettering to the plates consists of Italian or local terminology. This really affords a useful lesson. Some authors are so inclined—even in these pages—to give British names only for British birds, that they may by perusal of these cognomens attain some conception of how local names appear to both English and Italian readers. We certainly should not have recognised our old friend the Bullfinch under the name of "Ciuffolotto," and the need is accentuated of birds when referred to in print being called by their universal or scientific cognomens, as the author has done in his text.

This is a book worthy of a shelf on the line in every naturalist's library, inciting frequent reference, but also demanding a much stronger binding than the one in which it is issued.

Descriptive Catalogue of the Coleoptera of South Africa. By
L. PÉRINGUEY, Assistant Director, South African Museum.
Trans. South African Philosophical Society, vol. xii.

THE publications of museums show by their subject-matters the varying specialities pursued by the official *personnel*. Formerly the South African Museum, when under the charge of Mr. Trimen, was the seat of lepidopteral publication; while the advent of Mr. W. L. Selater produced volumes on mammalogy and ornithology. Now Mr. Péringuey has commenced a colossal work for one man to achieve, and is publishing nothing less than a descriptive catalogue of the South African Coleoptera, the last instalment of which occupies no fewer than eight hundred and ninety-six pages of vol. xii. of the Transactions of the South African Philosophical Society. This is not only an energetic but a courageous work for Mr. Péringuey to undertake away from European collections and libraries, and we trust he may be spared to complete his gigantic enterprise. A bare catalogue of South African Coleoptera alone is a desideratum, but a descriptive enumeration will place entomologists under an obligation, and they will welcome a work to whose virtues they will be wondrous kind, while to some unavoidable limitations they must critically be a little blind.

EDITORIAL GLEANINGS.

WE have extracted the two following paragraphs from the 'Pharmaceutical Journal' of August 16th :—

Spider Poison.—R. Kobert has investigated the debated question as to whether indigenous German spiders are poisonous to higher animals and men. He finds that the introduced species (*Chiracanthium nutrix*), particularly the female, which bites when disturbed, is toxic. A case occurred in which the bite of one of these spiders was followed by a rigor, and the wound subsequently suppurated. The native *Epeira diadema* is also poisonous. Of the juice of the whole spider, one milligramme injected into a cat occasioned death. Probably the fluid secreted by the poison glands alone would be much more toxic. The poison appears to be a soluble albuminoid. Sachs has extracted the poison by macerating the *Epeiras* in toluol water containing 10 per cent. of salt. By this means he has isolated very active hæmolysin, which disintegrates the blood corpuscles of man and animals at ordinary temperatures. It appears to be a toxin.—*Pharm. Centrallh.*

Toad Poison.—C. Phisalix and G. Bertrand have succeeded in isolating two toxic principles from the parotid gland and skin of the Common Toad (*Bufo vulgaris*). Of these bufotaline, $C_{119}H_{171}O_{25}$, occurs as a transparent resin, very soluble in alcohol, chloroform, and acetone; less soluble in ether, and almost insoluble in petroleum ether or in carbon disulphide. It is precipitated from alcoholic solution on the addition of water, forming an emulsion, which is redissolved on further adding a large volume of water. Although very dilute, the solution thus obtained is extremely toxic to Frogs. It acts on the heart, and does not affect the nervous system. Applied to the tongue, it has a bitter taste, and gives rise to a peculiar and very persistent sensation. It is obtained by squeezing the parotid glands of the animals under water.—*Comptes rend.*

THE investigation into the connection between Mosquitoes and fever, especially in West Africa, is still being pursued with activity. Lieut.-Colonel A. H. Morris, D.S.O., now in charge of the Northern Territories of the Gold Coast, has made a report to the Colonial Office on the subject, of which the following is an extract :—

"Now that so much attention is being paid to Dr. Ross's anti-Mosquito campaign in West Africa, it may be perhaps of interest to mention our efforts in this direction in Gambaga.

"Following out the instructions for the prevention of malarial fever published by the Liverpool School of Tropical Medicine, I caused all holes that might contain puddles, and so become breeding grounds

for the *Anopheles* Mosquito, to be filled up. Some hollows in rocks were discovered containing about 18 in. of water filled with thousands of larvæ.

"The Hausas' and Carriers' lines were inspected twice a week, in order to ensure no stagnant water being allowed to remain in old pots or tins. The general result has been an immense reduction in the number of Mosquitoes. With regard to my own quarters, in addition to taking these sanitary measures, I had every Mosquito killed so far as possible as soon as it appeared. The result of this was that my own house was nearly free from Mosquitoes, and I have only had half a day's fever during my time in Gambaga (nearly ten months). Whether this immunity has been due to the absence of the Mosquito, I do not venture to say."

From East Africa the same excellent testimony arrives. Reports by various administrative officers are appended by Mr. Sharpe in his report on the British Central African Protectorate. That of the chief medical officer describes malaria amongst the Europeans as decreasing on account of their care to protect themselves against Mosquito "bites."

THE Sea-serpent has again been sighted, this time on the Australian coast, by the captain of the steamer 'Chillagoe,' belonging to the Howard Smith Line (Melbourne). The 'Chillagoe' arrived at Sydney (N.S.W.), on July 13th, from Port Pirie (South Australia) direct, and Capt. W. Firth supplied the following particulars:—"On the passage from Port Pirie to Sydney, when off Ram Head, a monster serpent was seen by several members of the crew. Desiring to get a good view of this monster, the ship's course was altered. Closer inspection proved it to be an immense serpent of, as far as could be judged, from 30 ft. to 35 ft., with four dorsal fins about 6 ft. apart, standing about 4 ft. or 5 ft. high. The head resembled that of a Seal, only it was much larger, being about 2 ft. in diameter. When the ship approached to within 100 yards of the monster, it raised its head, looked at the vessel, and disappeared. It was seen by myself, the second officer, and several others. All agree that it resembled the serpent seen by those on board the 'Princess,' illustrated in the 'Strand Magazine,' the only visible difference being the fins, which seemed more angular than those in the 'Magazine.' The body of the serpent did not appear above the water, but it must have been of immense size."

[The above has appeared in the daily papers, and is here inserted without comment. It is necessary that these narratives should be collected.—ED.]

CORRECTION.—*Ante*, p. 319, twelfth line from bottom of page, for "exclusively" read "extensively."

